

Claims

- [c1] An imaging marker for the subcutaneous marking of tissue, comprising:
 - a first non-bioabsorbable element having a first primary imaging mode; and
 - a second non-bioabsorbable element having a second primary imaging mode;wherein the second primary imaging mode is different than the first primary imaging mode.
- [c2] The imaging marker of claim 1 wherein the first primary imaging mode is one of ultrasound, x-ray, CAT, and MRI.
- [c3] The imaging marker of claim 2 wherein the second primary imaging mode is one of ultrasound, x-ray, CAT, and MRI.
- [c4] The imaging marker of claim 3 wherein one of the first and second primary imaging modes is ultrasound and the other of the first and second primary imaging modes is x-ray.
- [c5] The imaging marker of claim 1 wherein the first non-bioabsorbable element is expandable in volume.
- [c6] The imaging marker of claim 5 wherein the first non-bioabsorbable element is made from PVA.
- [c7] The imaging marker of claim 6 wherein the second non-bioabsorbable element is made of metal.

- [c8] The imaging marker of claim 7 wherein at least a portion of one of the first and second non-bioabsorbable elements is embedded in the other of the first and second non-bioabsorbable elements.
- [c9] The imaging marker of claim 8 wherein the first primary imaging mode is ultrasound and the second primary imaging mode is x-ray.
- [c10] The imaging marker of claim 1 wherein the first non-bioabsorbable element is made from PVA.
- [c11] The imaging marker of claim 10 wherein the second non-bioabsorbable element is made of metal.
- [c12] The imaging marker of claim 1 wherein at least a portion of one of the first and second non-bioabsorbable elements is embedded in the other of the first and second non-bioabsorbable elements.
- [c13] The imaging marker of claim 12 wherein the one of the first and second non-bioabsorbable elements is completely embedded in the other of the first and second non-bioabsorbable elements.
- [c14] The imaging marker of claim 12 wherein the first non-bioabsorbable element comprises a loop that surrounds the second non-bioabsorbable element.
- [c15] The imaging marker of claim 12 wherein the first non-bioabsorbable element comprises a body with a foot.
- [c16] The imaging marker of claim 15 wherein the body is embedded

within the second non-bioabsorbable element.

- [c17] The imaging marker of claim 15 wherein the foot is embedded within the second non-bioabsorbable element.
- [c18] The imaging marker of claim 15 wherein the foot forms an anchor.
- [c19] The imaging marker of claim 1 and further comprising at least one additional non-bioabsorbable element, wherein each additional element has a primary imaging mode.
- [c20] An imaging marker for the subcutaneous marking of tissue, comprising:
 - a metal element; and
 - a PVA element;wherein the metal element and PVA element form a composite body.
- [c21] The imaging marker of claim 20 wherein at least a portion of one of the metal and the PVA elements is embedded in the other of the metal and the PVA elements.
- [c22] The imaging marker of claim 21 wherein the one of the metal and the PVA elements is completely embedded in the other of the metal and the PVA elements.
- [c23] The imaging marker of claim 21 wherein the metal element comprises a head with an anchor.

- [c24] The imaging marker of claim 23 wherein the head is embedded within the PVA element.
- [c25] The imaging marker of claim 23 wherein the metal element comprises a loop from which extends at least one foot, with the loop surrounding the PVA element to form the head and the at least one foot forming the anchor.
- [c26] The imaging marker of claim 25 wherein the loop has an inner diameter and the PVA element has an outer diameter, wherein the PVA element can expand so that the outer diameter is greater than the inner diameter to effect embedding of the one of the metal and the PVA elements in the other of the metal and the PVA elements.
- [c27] The imaging marker of claim 26 wherein the inner diameter is between 0.010 and 0.030 inches.
- [c28] The imaging marker of claim 27 wherein the outer diameter can be expanded to approximately twice the inner diameter.
- [c29] The imaging marker of claim 25 wherein the PVA element can be folded against the at least one foot so that the composite body is sized to be received within a hollow needle having a gage of less than 20.
- [c30] The imaging marker of claim 29 wherein the PVA element can be compressed to be sized for receipt within the hollow needle.

[c31] A marking device for percutaneously implanting an imaging marker, comprising:

a cannula defining a lumen and having a distal end and an expulsion opening near the distal end;

a stylet slidably received within the lumen for movement between a ready position in which a tip of the stylet is spaced inwardly from the distal end to form a marker recess therebetween, and an extended position in which the tip of the stylet is advanced toward the distal end; and

an imaging marker comprising a first non-bioabsorbable element having a first primary imaging mode, and a second non-bioabsorbable element having a second primary imaging mode, wherein the second primary imaging mode is different than the first primary imaging mode;

wherein movement of the stylet from the ready position to the extended position thereby ejects the imaging marker from the marker recess through the expulsion opening.

[c32] The marking device of claim 31 and further comprising a handle to be grasped by a user and the cannula having a proximal end mounted to the handle.

[c33] The marking device of claim 32 and further comprising an actuator for moving the stylet relative to the cannula.

[c34] The marking device of claim 33 wherein the actuator is mounted to the handle.

- [c35] The marking device of claim 34 wherein the actuator is a plunger movable between a first position and a second position for moving the stylet between the ready position and the extended position.
- [c36] The marking device of claim 35 wherein the cannula, the stylet, the actuator, and the handle form an introducer, and the introducer and the imaging marker form a self-contained marking device that can be easily and conveniently handled by a user to place the imaging marker at a predetermined location in a tissue mass by the user moving the plunger between the first and second positions to move the stylet from the ready to the extended position to thereby eject the imaging marker from the marker recess after the cannula is inserted into the tissue mass and the insertion tip is located at the predetermined location.
- [c37] The marking device of claim 36 wherein the first primary imaging mode is one of ultrasound, x-ray, CAT, and MRI.
- [c38] The marking device of claim 37 wherein the second primary imaging mode is one of ultrasound, x-ray, CAT, and MRI.
- [c39] The marking device of claim 38 wherein one of the first and second primary imaging modes is ultrasound and the other of the first and second primary imaging modes is x-ray.
- [c40] The marking device of claim 31 wherein the first non-bioabsorbable element is expandable in volume.

- [c41] The marking device of claim 40 wherein the first non-bioabsorbable element is made from PVA.
- [c42] The marking device of claim 41 wherein the second non-bioabsorbable element is made of metal.
- [c43] The marking device of claim 31 wherein at least a portion of one of the first and second non-bioabsorbable elements is embedded in the other of the first and second non-bioabsorbable elements.
- [c44] The marking device of claim 43 wherein the one of the first and second non-bioabsorbable elements is completely embedded in the other of the first and second non-bioabsorbable elements.
- [c45] The marking device of claim 43 wherein the first non-bioabsorbable element comprises a loop that surrounds the second non-bioabsorbable element.
- [c46] The marking device of claim 43 wherein the first non-bioabsorbable element comprises a head with at least one foot.
- [c47] The marking device of claim 46 wherein the body is embedded within the second non-bioabsorbable element.
- [c48] The marking device of claim 46 wherein the at least one foot is embedded within the second non-bioabsorbable element.
- [c49] The marking device of claim 46 wherein the at least one foot forms an anchor.

- [c50] A non-bioabsorbable imaging marker for the subcutaneous marking of tissue, comprising:
 - a first primary imaging mode and
 - a second primary imaging mode,wherein the second primary imaging mode is different than the first primary imaging mode.
- [c51] The non-bioabsorbable imaging marker of claim 50 wherein the first primary imaging mode is one of ultrasound, x-ray, CAT, and MRI.
- [c52] The non-bioabsorbable imaging marker of claim 51 wherein the second primary imaging mode is one of ultrasound, x-ray, CAT, and MRI.
- [c53] The non-bioabsorbable imaging marker of claim 52 wherein one of the first and second primary imaging modes is ultrasound and the other of the first and second primary imaging modes is x-ray.
- [c54] The non-bioabsorbable imaging marker of claim 50 and further comprising at least one additional primary imaging mode.